Introduction

This literature review focuses on a problem in my introductory Computer Applications course at Valley Catholic High School in Beaverton, OR. All high school students are required to take this computer course but may choose to enroll at anytime during high school. As a result, the class is made up of students in grades 9-12, all with various degrees of computer experience.

Previous to my teaching of this course, students would work independently through a textbook at their own pace, focusing on specific computer skills using Microsoft Word, Excel and PowerPoint. When I took over the curriculum 6 years ago, I changed the instruction to whole class instruction and integrated student-created projects into the curriculum, but still relied heavily on the DDC textbook for the scope and sequence of skills.

The problem with this environment is that computer skills are taught in isolation. The assignments in the book are situated in a business environment. Many of high school students can't relate to the book assignments and find them tedious. Individual projects are incorporated into the instruction for genuine practice but still, the tasks seem phony and made up. Students are not engaged in the assignments and often need to be reminded to take the projects seriously.

My focus for research is: how do I create authentic and engaging activities in a computer lab environment? How do I determine which types of technology might accomplish this goal? I want to discover which instructional strategies are appropriate to use with a high school technology course. I would like to find ways that students can utilize critical thinking skills and not just focus on computer skills to be effective users of technology. I want to research how to assist my students in evaluating their own metacognition.

Research Questions:

1. How do you plan and structure lessons that utilize authentic learning and that engages students?
2. What factors are involved in engaging students in technology-rich lessons?
3. What teaching strategies should be utilized when developing lessons that include technology?
4. Do developing critical thinking skills in students result in engaged learning?

Research

According to The American Youth Policy Forum (2000) instruction in today's high schools must change. Disengagement from the learning process is a widespread problem in high schools and students do not perceive how lessons are relevant to their lives. The American Youth Policy

Forum reports that lecture-style classes continue to dominate classroom instruction and content is divorced from the real world. Schools need to embrace new strategies for learning based on current research of how students learn, implement effective uses of technology in the classroom, and develop "21st Century Skills" while maintaining a rigorous academic curriculum (Burkhardt et al., 2003). It takes vision and planning to engage students in authentic learning experiences. Teachers must identify which instructional strategies are most effective and understand how to infuse technology into lessons with real world applications.

Students learn best when they are fully engaged in classroom activities. The North Central Regional Educational Laboratory (NCREL) reports that engaged learners take responsibility for their own education and are strategic in their learning process. These students are energized and find excitement and pleasure in learning (Barker & Bills, 1999). Lumsden (1994) concludes that when intrinsically motivated, students tend to employ strategies that demand more effort and enable them to process information deeply. Students who are engaged in the instructional process are more likely to maintain an interest in what they are studying than are those who are passive recipients of a prescribed curriculum (Tanner, Bottoms, Feagin & Bearman, 2003). In their 2003 study, *enGauge 21st Century Skills: Literacy in the Digital Age*, the NCREL reports that students who are curious often approach learning in unique ways. They may stumble upon topics that prompt spontaneous inquiry and are more likely to look for patterns or engage in hypothesis testing. Curious students are more persistent in examining new ideas in order to know more about them (Burkhardt et al., 2003, p. 38). In one study of student engagement, high school students creating hypermedia projects reported that they "often invested a considerable amount of time and effort in organizing and reorganizing information" (Chen & McGrath, 2003).

Educators must ensure that course materials relate to students' lives and emphasize ways learning can be applied in real-life situations (Brewster & Fager, 2000). Tasks must be authentic, challenging, multidisciplinary and/or thematic. This assumes that the best assignments are related to "real world problems", use real world technology tools, are built on life experiences and often require in-depth work (Barker & Bills). The Education Alliance (2000) at Brown University in their "*Good Models of Teaching with Technology*" state that real world tasks and primary sources connect learners to the world around them. Classroom activities should provoke student's curiosity, be open-ended and focus on the ability to produce relevant, high-quality products. A high degree of motivation and involvement was reported by students

involved in designing "real" projects for a community-based activity in Ontario, Canada (Hill & Smith, 1998).

The Northwest Regional Educational Laboratory (NWREL) proposes that students should have some control of their learning and that the tasks assigned must be challenging but achievable for all students. The NWREL also encourages teachers to arouse students' curiosity about the topic being studied by proposing interesting and challenging questions for students to examine and develop their own hypothesis (Brewster & Fager, 2000).

Other researchers from NCREL and the Arlington Heights School District 59 in Illinois support this idea of students pursuing solutions to problems by asking and refining questions or possibly debating ideas. Students in their study collected artifacts and data related to a theme (K: Animals and their habitats, 1-2: Recycling, 3: Rainforests, 4-5: Types of Energy), and then drawing conclusions from their results, they communicated their findings to their school community. These researchers also recommend project-based units that can be accomplished in multiple ways, typically with more than one answer or outcome. These tasks can be performed by student teams with different students taking on different or specialized roles (Hawkes, Foertsch & Youngren, 1999). Driscoll (2002) claims that students benefit from hearing perspectives other than their own and they each bring different strengths to complex and lengthy activities.

Promoting critical thinking in the classroom can support student engagement in learning. Researchers from NCREL define higher-order thinking and sound reasoning to include "the cognitive processes of analysis, comparison, inference and interpretation, evaluation and synthesis applied to a range of academic domains and problem-solving contexts" (Burkhardt et al., 2003, p. 44). Teachers can promote higher order thinking by infusing instruction with opportunities for students to read widely, to write, and to discuss. Working as teams gave students in a longitudinal study sponsored by Apple Classroom of Tomorrow (ACOT) opportunities to interact, share ideas and help each other. Some may perceive working with computers as isolating students from one another, but the data from their study suggests that isn't true (Tierney, Stowell, Desai, Whalin & Moss, 1992).

Learners use tasks and assignments to focus on issues, questions, or problems and then teachers can promote attention to the student's higher-level processes. Promoting metacognitive attention to thinking can assist students in developing a growing awareness of the relationship of thinking to reading, writing, speaking, and listening (Tama, 1989). The Education Alliance

(2000) states the use of reflective learning will encourage students to generate their own questions and describe their problem solving strategies. Instructors who wish to encourage good question and answer skills should allow for plenty of time for discussion, be patient, and to assume the role as a facilitator (Collier, Guenther & Veerman, 2002).

In their report, "*Instructional Strategies: How Teachers Teach Matters*" (2003) the Southern Regional Education Board (SREB) suggests to motivate all students to learn at higher levels, teachers should plan various instructional strategies that address students' different learning styles, backgrounds and interests. The challenge for teachers is to balance teacher-directed instruction and student-centered learning. Educators should base their instruction on the examination of course standards and performance goals as they relate to student needs, skills and interest. Good instructional planning stresses high expectations, involves teachers' working together and requires administrative support (Tanner, Bottoms, Feagin & Bearman, 2003).

One instructional method the SREB recommends because it is so prevalent in the business community is cooperative learning. Cooperative learning is an instructional strategy that encourages students to learn together but holds each student accountable for his or her learning. Students work in groups with specific tasks or roles assigned (The Education Alliance, 2000). This approach differs from group work because the assignment and the individual roles within the group are clearly defined and the students recognize the value of each team member's contribution to their collective work.

Another method of engaging students in learning is to use a project-based approach. Instruction presents students with problem-focused assignments that are meaningful, interesting and valuable. Projects not only reflect student interests but also meet one or more course standards. Unless they are linked to standards, the projects may be interesting and enjoyable but have little or no effect on academic or technical achievements (Tanner, Bottoms, Feagin & Bearman, 2003). Other researchers agree that the "problem" must raise concepts and principles relevant to the curriculum. They suggest the problems must be "real" because then students are willing to explore all dimension of the problem. Real problems tend to engage learners more especially if they are familiar with the problem or can relate to it. Finally, students want to know the outcome of the problem and this holds their interests (Savery & Duffy, 1995). Enough support by teachers during projects must be provided so students can succeed. Too much support, however, can be overwhelming and too little support can make the task too great (Hawkes, Foertsch & Youngren, 1999).

Wolf, Brush & Saye (2003) suggest that using the "Big6" information problem-solving model can act as an effective metacognitive scaffold for students engaging in complex research based activities. Results from their study suggest that students who completed research writing activities (newspaper article creation) supported by the Eisenberg and Berkowitz Information Problem-Solving (EBIPS, also known as the "Big 6") model created newspaper articles that were more accurate, utilized a wider variety of information resources, and contained richer details that students who did not have this support. The six stages of the Big6 (there are two sub-stages are part of each main category in the Big6 model) are:

1. Task Definition
1.1 Define the information problem
1.2 Identify information needed

2. Information Seeking Strategies
2.1 Determine all possible sources
2.2 Select the best sources

3. Location and Access
3.1 Locate sources (intellectually and physically)
3.2 Find information within sources

4. Use of Information
4.1 Engage (e.g., read, hear, view, touch)
4.2 Extract relevant information

5. Synthesis
5.1 Organize from multiple sources
5.2 Present the information

6. Evaluation
6.1 Judge the product (effectiveness)
6.2 Judge the process (efficiency)
(Eisenberg, 2006)

The Socratic Method is a dynamic teaching technique that engages learners, stimulates critical thinking and encourages classroom discussions. The greatest challenge in this method is to design thought-provoking questions that will engage students in productive discussions. Students who are unaccustomed to this instructional method need to know that the questions are not judgmental but are designed to help them examine their attitudes, beliefs, knowledge and logic (Tanner, Bottoms, Feagin & Bearman, 2003). This method is quite flexible and can be adapted to any subject area. Whatever instructional method is used by the teacher, it is critical that it is driven by content standards.

Research shows that classrooms that focus on constructivist learning can promote student engagement. "Constructivism focuses on knowledge construction, not knowledge reproduction" (Matusevich, 1995). David G. Lebow (1995) from Florida State University identified fourteen values that summarize the constructivist framework in learning (and many of them have already been addressed in this report: active engagement, authenticity, collaboration, community,

multiple perspectives, and so on). His research states that in generative teaching for understanding, the teacher's role is to help students build connections between their knowledge, beliefs and experience on one hand, and school subject matter on the other. Within this model, students construct new knowledge based on the experiences they have during instruction.

Educators that focus on constructivist learning shift their focus from whole class direct instruction to small group projects. There is a high level of interaction between the students and each other as well as the teacher (who is seen more as a "guide on the side"). Students in this type of environment might be learning different material, but still share their knowledge with each other. The focus of assignments is on originality instead of reiterating learned information. Assessment techniques focus on instructional outcomes and the learning process (Tanner, Bottoms, Feagin & Bearman, 2003).

Globalization and the World Wide Web are accelerating the pace of change in today's world (Lemke, 2002). Students need to learn how to be information managers rather than be able to regurgitate facts (Matusevich, 1995). In the 2000 report, "*High Schools of the Millennium: Report of the Workgroup*" by the American Youth Policy Forum, it states that educators need to learn how to integrate large amounts of new information into their curriculum and how to help students discriminate among so many vast sources of information. Teenagers (aged 13-17) in 2002 spent more time each day with digital media (3.5 hours) than they did watching television (3.1 hours). Students of today are digitally savvy. The challenge for educators is to help students develop skills that enable them to fully realize technology's most positive effects (Burkhardt et al., 2003, p. 6).

In a technology-rich classroom one must remember that the educational focus is on learning and instructional goals instead of the technology itself (Matusevich, 1995). This is very relevant to my classes at Valley Catholic because the technology tools learned in my computer courses are taught outside of the high school curriculum – a situation that I do not have control over at this time. Research shows that simply acquiring high-performance technology tools will not ensure a more authentic instructional environment, engaged learning, or greater student achievement. It needs to be used effectively and rooted in challenging and real-life tasks. It can serve as a tool to support, enhance and extend instruction in ways that are not possible without it (Jones, 1998). Technology is most powerful when students and teachers take advantage of its sophistication and versatility to support higher-order thinking and conceptualizing (Ringstaff & Kelley, 2002). In one 10-year long ACOT classroom study (1994) researchers found that

teachers who allowed students to learn computer skills within the context of a meaningful assignment – rather than setting aside a block of "computer time" during which students would practice keyboarding or word processing – were generally rewarded with higher levels of student engagement (Sandholtz, Ringstaff & Dwyer, 1994). Henry Jay Becker, a professor of education at the University of California, Irvine thinks that educators should move away from teaching isolated technology skills and instead include more constructivist learning opportunities in order to take full advantage of technology (Kimble, 1999; Salpeter, 2000).

High school science students using technology for a research activity on water often credited the computer for providing a fund and effective way of learning. Chen and McGrath (2003) report the students felt that the hypermedia design activities provided an intrinsically motivating learning experience by allowing them to express themselves creatively. The technology tool appeared to make the "cognitive processes such as planning, transforming, evaluating and revising more manageable and engaging through the flexibility and modifiability of the tool for visualization and knowledge representation".

Technology-rich lessons complement constructivist learning. Students take ownership of their learning when using a wide variety of technical tools. Students can use computers to create authentic documents, locate relevant information on the Internet, collaborate with remote groups through email, blogs and bulletin boards, perform real-world calculations and make dynamic engaging presentations (Thornburg, 2002). The International Society for Technology in Education (ISTE) suggests multiple reasons for student to use contemporary technology tools: collaboration, promotion of creativity, construction of models, preparation of publications, and other creative works (Burkhardt et al., 2003, p. 41). An example of this is how the state of Utah Resource Web (SURWEB) multimedia tool and resource database enables students and teachers to create and produce multimedia presentations using a vast archive of historical photographs, images and text (Barker & Bills, 1999).

Some technology tools can extend memory and make thinking visible, like brainstorming and concept mapping software (Driscoll, 2002). Teachers should encourage connecting information to something already known and that process is best achieved with reflection (Hunt, 1998). Learning is facilitated when students get feedback about their thinking. Technology tools can promote communication within and outside the classroom and make it easier for feedback, reflection and revision to occur (Driscoll, 2002). Email, wikis, blogs and discussion forums are useful teaching and learning tools because they provide a space for students to reflect and

publish their thoughts and understandings. In their long-term study of computer-mediated discussion (CMD) Schallert & Heed (2003) conclude that students learn not only by posting comments in the discussion but also by reading other students' and their teacher's comments. These tools provide opportunities for feedback and potential scaffolding of new ideas by both teachers and classmates. They also feature hyperlinks, which help students begin to understand the connections between content and how new knowledge is constructed (Ferdig & Trammell, 2004).

Not all research is enthusiastic about technology in schools. Todd Oppenheimer (2003) in his book *The Flickering Mind: The False Promise of Technology in the Classroom* states

> "…the emergence of the Internet made the high-tech classroom seem like education's long-awaited savior. With missionary zeal, technology promoter's defined this initiative as nothing short of a revolution. It was supposed to do more than any reform in recent memory to revive our weakened schools and prepare today's students for tomorrow's increasingly high-tech jobs. In the ensuring year – partly because of growing skepticism about classroom technology, and technology in general, and partly because of the fickleness of public attention – the topic has somewhat receded into the shadows".

Other researchers comment "… most critics don't refute positive research results but instead criticize the way technology is used in classrooms, the technical expertise and preparedness of teachers, and the relative costs of acquiring technology." Those who are serious about improving student learning through the use of technology can learn much from critics about how to strengthen the process (Kimble, 1999). Schools need to help ensure equal access to information through technology for all students and to provide time and resources to faculty to help them stay current with the latest advances (American Youth Policy Forum, 2000).

Students themselves want schools to place priority on developing programs to teach keyboarding, computer and Internet literacy skills. Internet-savvy students are coming to school with different expectations, different skills, and access to different resources. Students are frustrated and increasingly dissatisfied by the digital disconnect they are experiencing at school. They cannot conceive of doing schoolwork without Internet access and yet they are not being given many opportunities in school to take advantage of the Internet (Levin, 2002).

Conclusion

Student engagement is the key to success and achievement in school. When students are given opportunities to participate in real world experiences, when they are asked to critically

investigate issues and ask probing questions, and when they are given open-ended, interesting learning opportunities they will be motivated to learn. Educators must employ a variety of instructional strategies to meet the needs of differentiated classrooms and insure a classroom environment that is conducive to learning.

Students in technology-rich classrooms learn how to find information, ask questions, assess sources, hypothesize and communicate effectively – all skills needed for workers in the 21st century workplace. Technology's pervasive use across almost all aspects of modern life – including business, industry, communication and entertainment – warrants continued efforts on the part of educators to prepare students for participation in a technological world. According to Pew Internet & American Life Project, 78% of children between the ages of 12-17 go online. Students report "that the Internet helps them navigate their way through school and spend more time learning in depth about what is most important to them personally."

All students should have the opportunity to attend dynamic, high quality schools that are designed to engage students in authentic learning experiences to meet the challenges of the "Digital Age".

References

American Youth Policy Forum (2000, August). *High schools of the millennium. Report of the workgroup*. American Youth Policy Forum, Washington, D.C. (ERIC Document Reproduction Services No. ED449572).

Barker, B. O. & Bills, L. (1999, October). *Engaged learning using the Internet: SURWEB as a student-focused learning tool.* Paper presented at the 91st Annual Conference of the National Rural Education Association, Colorado Springs, CO. (ERIC Document Reproduction Services No. 439691).

Brewster, C. & Fager, J. (2000). *Increasing student engagement and motivation: From time-on-task to homework*. Northwest Regional Educational Laboratory, Portland, OR. Retrieved September 28, 2006, from NWREL website: http://www.nwrel.org/request/oct00/.

Burkhardt, G., Monsour M., Valdez, G., Gunn, C., Dawson, M., Lemke, C., et al., (2003). *enGauge 21st Century Skills: Literacy in the digital age*. North Central Regional Educational Laboratory and the Metiri Group, Oak Brook, IL. Retrieved September 21, 2006, from the NCREL website: http://www.ncrel.org/engauge.

Chen, P. & McGrath, D. (2003). Moments of joy: Student engagement and conceptual learning in the design of hypermedia documents [Electronic version]. *Journal of Research on Technology in Education, 35(3),* 402-422.

Collier, K., Guenther, T. & Veerman, C. (2002). *Developing critical thinking skills through a variety of instructional strategies.* Master of Arts Action Research Project, Saint Xavier University and SkyLight Professional Development Field-Based Master's Program. (ERIC Document Reproduction Service No. 469416).

Driscoll, M. P. (2002, October). *How people learn (and what technology might have to do with it).* ERIC Clearinghouse on Information and Technology. Syracuse, NY. (ERIC Document Reproduction Service No. ED470032).

Education Alliance, The (2000). *Good Models of Teaching with Technology (GMOTT).* Brown University, Providence, RI. Retrieved September 26, 2006, from http://knowledgeloom.org/media/bpinter/1163/elements.html

Eisenberg, M. (2006, Updated August 13). *A Big6 skills overview (Originally published November 19th 2001).* Accessed December 2, 2006 from, http://www.big6.com/showarticle.php?id=16

Ferdig, R.E. & Trammell K.D. (2004). Content Delivery in the 'Blogosphere'. *T.H.E. Journal*, Retrieved on October 1, 2006, from http://www.thejournal.com/articles/16626

Hawkes, M., Foertsch, M., & Youngren, B. (1999) *Educational technology for engaged learning. District 59 technology program evaluation*. North Central Regional Educational Laboratory, Oak Brook, IL. (ERIC Document Reproduction Service No. ED437413)

Hill, A.M., & Smith, H.A., (1998). Practice meets theory in technology education: A case of authentic learning in the high school setting. *Journal of Technology Education, 9(2),* Retrieved December 1, 2006 from, http://scholar.lib.vt.edu/ejournals/JTE/v9n2/hill.html

Hunt, N.P. (1998, June). *Designing instruction for the web: Incorporating new conceptions of the learning process.* Proceedings at ED-MEDIA/ED-TELECOM 98 World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunicational, Freiburg, Germany. (ERIC Document Reproduction Services No. ED428673)

Jones, B.F. (1998). *Learning with technology: Integrating new technologies into classroom instruction*. North Central Regional Educational Laboratory, Oak Brook, IL. (ERIC Document Reproduction Services No. ED440636). Course documents retrieved on September 30, 2006, from NCWEL website: http://www.ncrtec.org/pd/lwtres/resource.htm#gpt

Kimble, C. (1999). *The impact of technology on learning: making sense of the research*. Mid-continent Regional Educational Laboratory, Aurora, CO. Retrieved September 28, 2006, from MCREL website: http://www.mcrel.org

Lebrow, D.G. (1995). *Constructivist values and emerging technologies: Transforming classrooms into learning environments.* Proceedings of the 1995 Annual National Convention of the Association for Educational Communications of Technology, Anaheim, CA. (ERIC Document Reproduction Services No. ED383318).

Lemke, C. (2002). *enGauge 21st century skills: Digital literacies for a digital age.* North Central Regional Educational Lab and the Metiri Group, Oak Brook, IL. (ERIC Document Reproduction Service No. ED463753).

Levin D. & Arafeh S. (2002). *The digital disconnect: The widening gap between Internet savvy students and their school.* Pew Internet & American Life Project. Retrieved on October 1, 2006, from http://www.pewinternet.org/PPF/r/67/report_display.asp

Lumsden, L.S. (1994, June). *Student Motivation to Learn*. Eric Clearinghouse on Educational Management, University of Oregon – No. 92, Eugene, OR. (Eric Document Reproduction Services No. 92 EDO-EA-94-7).

Matusevich, M.N. (1995). *School reform*: *What role can technology play in a constructivist setting?* Montgomery County Public Schools, VA. Retrieved on September 8, 2006, from http://pixel.cs.vt.edu/fis/techcons.html

Oppenheimer, T. (2003). *The flickering mind: the false promise of technology in the classroom and how learning can be saved.* Random House, New York.

Ringstaff, C., & Kelley, L., (2002, August). *Investing in technology: The learning return (WestEd policy brief).* Accessed December 1, 2006 from, http://www.wested.org/cs/we/view/rs/666

Salpeter, J. (2000, June). What does the research say about technology's impact on education? *Technology & Learning (Reprinted from May 1998)*. Accessed September 28, 2006, from http://www.techlearning.com/db_area/archives/TL/062000/archives/interv.html

Sandholtz, J. H., Ringstaff, C. & Dwyer, D (1994). *Student engagement revisited: Views from technology-rich classrooms*. Apple Classrooms of Tomorrow. Retrieved September 8, 2006, from ACOT website: http://www.apple.com/education/k12/leadership/acot/library.html

Savery, J.R., & Duffy, T.M. (1995). *Problem-Based Learning: An instructional model and its constructivist framework.* In Brent Wilson (Ed.), *Constructivist Learning Environments: Case studies in instructional design.* Englewood Cliffs NJ: Educational Technology Publications. Retrieved October 12, 2006 from http://www3.uakron.edu/edfound/people/savery/papers/sav-duff.html

Schallert, D.L., & Reed, J.H. (2003). Intellectual, motivational, textual and cultural considerations in teaching and learning with computer-mediated discussion [Electronic version]. *Journal of Research on Technology in Education*, *36(2)*, 103-118.

Tama, C.M. (1989, June). *Critical thinking: Promoting it in the classroom*. ERIC Clearinghouse on Reading and Communication Skills, Bloomington, IN. (ERIC Document Reproduction Service No. ED306554)

Tanner, B. M., Bottoms, G. Feagin, C. & Bearman, A. (2003). *Instructional strategies: How teachers teach matters.* Southern Regional Educational Board, Atlanta, GA. (ERIC Document Reproduction Service No. ED479271).

Thornburg, D.D. (2002). *The new basics: Education and the future of work in the telematic age.* The Thornburg Center. Accessed September 27, 2006, from http://www.ascd.org/portal/site/ascd/template.chapter/menuitem.5d91564f4fe4548cdeb3ffdb62108a0c/?chapterMgmtId=07de86b18fcaff00VgnVCM1000003d01a8c0RCRD

Tierney, R. J., Kieffer, R. Stowell, L., Desai, L.E., Whalin, K., & Moss, A.G. (1992). *Computer acquisition: A longitudinal study of the influence of high computer access on students' thinking, learning and interactions.* Apple Classrooms of Tomorrow, ACOT Report #16. Retrieved September 8, 2006, from ACOT website: http://www.apple.com/education/k12/leadership/acot/library.html

Wolf, S.A., Brush, T., & Saye, J., (2003). Using an information problem-solving model as a metacognitive scaffold for multimedia-supported information-based problems [Electronic version]. *Journal of Research on Technology in Education, 35(3),* 321-341.

ARP Action Plan

The Environment

Valley Catholic School is a grade 7-12 private Catholic middle and high school of 500 students located in Beaverton, Oregon. The school promotes a college prep curriculum and most of the students are involved in the acclaimed music and athletic programs. The school community draws students from families that work in the high tech industry in Oregon (Intel, Tektronics, and Nike) as well from the neighboring Catholic elementary schools. There are about 25 full time faculty members and 15 administrative and support staff.

All students are required to complete one semester of computer applications (keyboarding, Word, Excel, and PowerPoint) but may choose to enroll at anytime during high school. As a result, the class is made up of students in grades 9-12, all with various degrees of computer experience. To meet the graduation requirement students must also complete one other computer elective: Newspaper/Web Design, Graphic Design, Digital Video Production, and/or Yearbook

Previous to my teaching of the computer applications course, students would work independently through a textbook at their own pace, focusing on specific computer skills using Microsoft Word, Excel and PowerPoint. When I took over the curriculum 6 years ago, I changed the instruction to whole class instruction and integrated student-created projects into the curriculum, but still relied heavily on the DDC textbook for the scope and sequence of skills.

I am the Computer Department Chair and I teach almost all of the computer courses (except Yearbook). There are three full-time tech support personnel who maintain the network for the entire campus which consists of a convent, pre-school, grade school, middle/ high school, and nursing home.

The computer lab where I teach is brand new. There are 30 new Dell desktop computers, all with firewire, DVD-RW capabilities and hi speed Internet. There is a teaching station hooked up to an Infocus projector. In the lab, there is also a scanner, two digital cameras, six digital camcorders, and two printers. There is a second computer lab that teachers may use with their whole class and there are also 15 more computers in the school library.

Valley Catholic School is fairly traditional. Some teachers integrate technology into the curriculum but many of the courses use a traditional lecture format. Other departments expect that students already have the required technology skills for class even though the students can choose to take their technology credits at any time during their schooling.

The Problem

The challenges in the Computer Applications course are to make the learning of the technology skills relevant to the student's experience but also authentic. One problem is that computer skills are taught in isolation. The assignments in the textbook are situated in a business environment. Many of high school students can't relate to the book assignments and find them tedious. Individual projects are incorporated into the instruction for genuine practice but still, the tasks seem phony and made up. Students are not engaged in the assignments and often need to be reminded to take the projects seriously.

One of the reasons for this is that unlike a subject area course, the focus of the projects is on the technology skills, not on the subject content. It is challenging to create technology projects that have purpose and are authentic without relying on a specific subject matter. Another issue is presenting and creating authentic assignments that are motivating to a high school student and to not duplicate something they have already experienced in another class. Currently, students work on individual projects and there is little group work or discussion about the learning process. The computer curriculum is not set by a school district or board, so there is flexibility for content changes and curriculum. Assessment is another issue. Creating rubrics or authentic assessments that appropriately evaluate skills is difficult.

Brief Literature Review of Problem

Student engagement is the key to success and achievement in school. When students are given opportunities to participate in real world experiences, when they are asked to critically investigate issues and ask probing questions, and when they are given open-ended, interesting learning opportunities they will be motivated to learn. Students who are engaged in the instructional process are more likely to maintain an interest in what they are studying than are those who are passive recipients of a prescribed curriculum. Teachers can promote higher order thinking by infusing instruction with opportunities for students to read widely, to write, and to discuss. Educators must employ a variety of instructional strategies to meet the needs of differentiated classrooms and insure a classroom environment that is conducive to learning.

Students in technology-rich classrooms learn how to find information, ask questions, assess sources, hypothesize and communicate effectively – all skills needed for workers in the 21st century workplace. Technology tools can promote communication within and outside the

classroom and make it easier for feedback, reflection and revision to occur. Technology's pervasive use across almost all aspects of modern life – including business, industry, communication and entertainment – warrants continued efforts on the part of educators to prepare students for participation in a technological world. All students should have the opportunity to attend dynamic, high quality schools that are designed to engage students in authentic learning experiences to meet the challenges of the "Digital Age".

Addressing the Problem

My plan is to change how computer skills are taught in my introductory Computer Applications course. Instead of teaching individual lessons and focusing on teaching specific computer skills in Word, Excel and PowerPoint, I plan on creating several authentic long-term projects and we will use technology tools to investigate those topics. Specific themes have not yet been chosen but some that I am considering are:

- Exploring careers
- Teen athletes, competition & steroid use
- History of our community
- Global warming and what can we do about it
- Teen issues: school stress, drug use, sleep deprivation
- Digital storytelling with the elderly
- Personal finance
- History of music

My idea is as the students explore the themes in small groups; they will engage in a variety of research techniques and use the scaffolding of the Big6 model. I want to make sure there is a "real world" component and have students use Web 2.0 tools (blogs, wikis, social bookmarking) for metacognitive reflection and interaction. I hope to give students choice in choosing (at least) one of the themes and will involve them in making decisions on how to best share the information.

I will continue to make sure that students are exposed to a variety of technical skills. Students could possibly use Word to create documents (outlines, flyers, mail merge letters, and/or newsletters) related to the theme and use Excel to collect data, use formulas to analyze the information and graph the results. PowerPoint can be used to share the information or create interactive presentations.

What data can you gather to determine a "before" picture?

Curriculum:

- Current syllabus of Computer Applications course
- Copies of textbook lessons
- Samples of student work (from textbook and projects)
- Samples of quizzes and Unit Test

Student attitudes and engagement:

- Video of direct instruction
  - Determine time on task
  - Determine who is actively engaged
- Survey of student's attitudes
- Student interviews
- Teacher observations on blog

What data can you gather to determine the effects of the changes you have made?

Curriculum:

- Proposed syllabus of Computer Applications course
- Description of Authentic Projects
- Pre & Post questionnaires about thematic topic
- Basic computer skill pre & post test
- Samples of student work
- Student wiki, del.icio.us bookmarks

Student attitudes and engagement:

- Video/or observation of instruction or group work
  - Determine time on task
  - Determine who is actively engaged
  - Determine social interactions
- Survey of student's attitudes
- Student evaluations of projects
- Student blogs & analysis of content
- Student interviews
- Daily Journal of class activities
- Teacher observations on blog
- Mentor teacher observation
- Parent survey
- Photos

Timeline

December – Mid-January 2007:
- Gather "before" data
- Meet with Principal to review plan
- Obtain student permission forms

February 2007
- Cycle 1 – first thematic unit

End Feb – Mid March 2007
- Measure for change

April 2007
- Cycle 2 – second thematic unit

End April 2007
- Measure for change

May 2007
- Cycle 3 – third thematic unit

End May 2007
- Final wrap up of data gathering